

Programming for Robotics

Instructor Information

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Course Information

Lab in room R2 & Lecture in room D2 (See Map)
8/26 & 9/2 are introductory days, 1st day of Certificate courses is 9/9
At this time, Certifications do *not* count towards GPA

Course Details

- This course is intended to bring an introduction to programming for embedded platforms with a focus on particular robotics and competitions that are already used by the NPHS robotics club so students can easily integrate between both this class and the club.
- This course will explain the basic concepts of what, and how computers & embedded systems work, and how to program them, as well as briefly touch on the jobs that this course can prepare you for.
- This course will extensively go over visual and text-based programming for the C language with a focus on the VEX libraries; text based programming for the Java language with a focus on FRC & roboRIO libraries; and visual and text-based programming for the proprietary JC language (based off C) that the Abilix C-series robotics platform uses.
- **Students who have Sports** or other season dependant obligations can elect to take only the Fall or Spring semester of this course, rather than the full year, or can mix and match which certifications taken.
- There are only **36 days** we can meet during the 2016/2017 school year. The first two are introductory.

Every Friday		In order to allow students who have a 5th period (2:15pm-3:05pm) to participate in this class, the schedule has been broken up into three sections per day. <u>Students are only required to attend one lecture, and one lab per day.</u> If the student does not have a 5th period, they can either do the lab on the same day, after the lecture, or they can do their lab the following week before the next lecture, or they can come to both if they so choose. If the student has a 5th period, they only have to attend the lab after the lecture.
2:15pm - 3:05pm	Lab	
3:15pm - 4:05pm	Lecture	
4:15pm - 5:05pm	Lab	

Fall Semester (16 Days)		Spring Semester (18 Days)	
<i>EasyC for VEX Cortex</i>	<i>RobotC for VEX Cortex</i>	<i>Java for roboRIO (FRC)</i>	<i>Abilix C-Series (WER)</i>
09/09 through ??/??	??/?? through 01/20	01/27 through MM/DD	MM/DD through 06/09
<ul style="list-style-type: none"> • Introduction to programming for robotics. • Visual "Drag & Drop" programming style for the C language. • Pre-Built robots with motors and sensors specifically for testing code. 	<ul style="list-style-type: none"> • Almost Identical to the visual programming, except now done only with typed programming. • Ability to compete in regional VEX competitions. 	<ul style="list-style-type: none"> • Introduction to the Java language (used in AP Comp Sci) • Introduction to Industrial Robotics • Text-Based programming • Useful if interested in the FIRST Robotics Competition 	<ul style="list-style-type: none"> • C-like language with both visual Drag & Drop and Typed styles. • Ability to compete in the World Educational Robotics competition

Upon completion of the requirements of each programming platform, and a passing score of 70% or higher, students will receive a Certificate of Completion from Robotics and Things, Inc. Each certificate will come with the complete breakdown of requirements and the student's score on the back, and a unique ID that can be looked up online at www.tobeadded.com/lookup. Unfortunately, at this time, the grades from these certifications do *not* go on the student's transcripts or GPA, but they can be put on a resume and shown to employers.

GRADING:

- Attendance is required for grade: if you can *not* make a lecture or lab, please inform me ahead of time so I can make arrangements - simply skipping a portion of the course will prevent you from being eligible for the certification, so any time missed **must** be made up.
- Extra Credit is NOT offered: At this time, due to the nature of the certification, I can *not* offer extra credit.
- There is **no homework** for this course: BUT - if you can not complete the assignment within the Lab time, you might have to come in on another day or at another time to finish. Because we program ROBOTS, and the robots are expensive and owned by the school, we generally do not allow students to take them home without extraordinary or unusual circumstances, but we will allow students to come in during other times (which can be arranged with the instructor) to make up any work **without penalty**.
- Late work will be accepted no later than the end of the last day of each certification course: The requirements for each certification require that everything must be completed, but if something is late, it must be turned in prior to applying for the certificate.
- Incentives will be given for good performance: Sometimes we will have competitions (in-class or regional level) or other activities that do not contribute to the certification or grade, and performing in these will grant rewards, based on what is available at the time and the amount of effort the student(s) put in.
- As the Senior Educator for Robotics and Things, Inc. I have the right to make changes to the curriculum at any time - both for this class, and for the certification. If you feel that anything is unfair or need improvement, please notify me so I can make the appropriate changes.

EasyC for VEX Cortex Certification Requirements	
Points 5	Understand the basic components of a VEX Robot using Cortex and how they communicate with each other, and what Pulse Width Modulation (PWM) is.
5	Understand the layout of EasyC and can use wired and wireless communications with the robot.
10	Ability to write an EasyC program from scratch intended for the Tele-Operated Squarebot model.
10	Ability to write a program from scratch for LED screen & line-tracker sensors using comments.
10	Ability to adapt the previous program for line-following with encoders to make it more accurate.
10	Ability to write a program that operates the Ultrasonic sensor, light sensor, & flashlight.
10	Ability to write a program that operates the LEDs, Buttons/Limit Switches, & Speaker.
10	Ability to write a program that operates the Jumper and Potentiometer.
5	Ability to load a pre-built program and find then fix errors.
25	Ability to combine everything learned so far into one single program - everything must work and have comments throughout. The individual project may vary, but at least one component from each activity will be used in this final.
Total: 100	

RobotC for VEX Cortex Certification Requirements

Points 5	Understand the basic components of a VEX Robot using Cortex and how they communicate with each other, and what Pulse Width Modulation (PWM) is.
5	Understand the layout of RobotC and can use wired and wireless communications with the robot.
10	Ability to write a RobotC program from scratch intended for the Tele-Operated Squarebot model.
10	Ability to write a program from scratch for LED screen & line-tracker sensors using comments.
10	Ability to adapt the previous program for line-following with encoders to make it more accurate.
10	Ability to write a program that operates the Ultrasonic sensor, light sensor, & flashlight.
10	Ability to write a program that operates the LEDs, Buttons/Limit Switches, & Speaker.
10	Ability to write a program that operates the Jumper and Potentiometer.
5	Ability to load a pre-built program and find then fix errors.
25	Ability to combine everything learned so far into one single program - everything must work and have comments throughout. The individual project may vary, but at least one component from each activity will be used in this final.
Total: 100	

Java for roboRIO Certification Requirements

Points 5	Understand the basic components of an FRC Robot using the roboRIO and how they communicate with each other, what Pulse Width Modulation (PWM) and CAN BUS is.
5	Understand the Java IDE and the Driver Station for wired and wireless communications w/ RIO.
10	Ability to write a program from scratch for Tele-Op driving of a Tank Drive robot, using GitHub.
10	Ability create a custom Driver Station that uses camera feed and diagnostic tools.
10	Ability to write an object oriented and command based program with comments.
10	Ability to write a program from scratch for Tele-Op driving of a Holonomic robot.
10	Ability to write an autonomous program using encoders and the CAN bus.
10	Ability to write a program that operates Pneumatics.
5	Ability to load a pre-built program and find then fix errors.
25	Ability to combine everything learned so far into one single program - everything must work and have comments throughout. The individual project may vary, but at least one component from each activity will be used in this final.
Total: 100	

Abilix C-Series Certification Requirements

Points 10	Understand the basic components of an Abilix C-Series Robot and how they communicate with each other.
10	Understand the layout of the Abilix IDE for wired and wireless communications with the robot.
15	TBA
15	TBA
15	TBA
10	Ability to load a pre-built program and find then fix errors.
25	Ability to combine everything learned so far into one single program - everything must work and have comments throughout. The individual project may vary, but at least one component from each activity will be used in this final.
Total: 100	

